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APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO
09 651,790	08 30 2000	Pary Baluswamy	CF 027 PROV.	2095

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EXAMINER

PIZARRO CRESPO, MARCOS D

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 06/19/2002

16

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/651,790

Applicant(s)

BALUSWAMY ET AL.

Examiner

Marcos D. Pizarro-Crespo

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 May 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 1-15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 16-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-21 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 24 May 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 4) ☐ Interview Summary (PTO-413) Paper Notice

Application/Control Number: 09/651,790 (Final Rejection)
Art Unit: 2814

Page 2

Attorney's Docket Number: 4307 US (99-1193)

Filing Date: 8/20/2000

Claimed Foreign Priority Date: none

Applicant(s): Baluswamy et al.

Examiner: Marcos D. Pizarro-Crespo

DETAILED ACTION

This Office action responds to the amendment (paper no. 15) filed on 5/24/2002.

Acknowledgment

1. The amendment (paper no. 15) filed on 5/24/2002 in response to the Office action (paper no. 12) mailed on 2/26/2002 has been entered. The present Office action (paper no. 16) is made with all the suggested amendments being fully considered. Accordingly, pending in this Office action are claims 1-21.

Drawings

2. The proposed drawing corrections and/or the proposed substitute sheets of drawings, filed on 1/3/2001 and on 5/24/2002 have been approved. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid **ABANDONMENT** of the application. The correction to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

On the basis for the rejections under this section made in this Office action

A person shall be entitled to a patent unless –

Art Unit: 2814

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 16-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Deguchi (JP 62-18714).

5. Deguchi shows (see, e.g., fig. 1, abstract) all aspects of the instant invention including a method to form an overlay target including a series of raised lines, the method comprising:

- providing a substrate **10**
- depositing a resist layer **15** over the substrate **10**
- patterning the resist layer **15** to include a pattern defining the overlay target (abstract)
- etching the substrate **10** to form the overlay target

6. Regarding claim 17, Deguchi shows (abstract) that the substrate comprises a semiconductor substrate.

7. Regarding claim 18, Deguchi deposits the resist layer **15** directly over the semiconductor substrate **10** (see, e.g., fig. 1).

8. Regarding claim 19, Deguchi shows that a material layer **14** may be deposited over the top surface of the semiconductor substrate **10** (see, e.g., fig. 4).

9. Regarding claim 20, Deguchi shows that the resist layer **15** may be deposited over the material layer **14** so that the step of etching the substrate **10** comprises etching

Claims 16-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Kurosaki (JP 58-90728).

11. Kinoshita shows (see, e.g., fig. 3, abstract) all aspects of the instant invention including a method to form an overlay target including a series of raised lines, the method comprising:

- providing a substrate **1**
- depositing a resist layer **22, 25** over the substrate **1**
- patterning the resist layer **22, 25** to include a pattern **23, 24** defining the overlay target
- etching the substrate **1** to form the overlay target **4, 5, 7**

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to prior art under 35 U.S.C. 103(a)

14. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kinoshita in view of Xu (US 5908319).

15. Regarding claim 21, Kinoshita shows most aspects of the instant invention (see paragraph 11 above), except for the substrate etching step comprising wet etching the substrate **1** to form the overlay target **4, 5, 7**. Kinoshita differently teaches the use of plasma etching.

Xu, on the other hand, teaches that wet etching and plasma etching are known etching techniques that are conventionally used in the fabrication of integrated circuits (col.1/ll.10,11,21,25). As expressed by Xu, etching is typically performed with either wet etching or plasma etching (col.1/ll.21-24).

It would have been obvious to a person having ordinary skill in the art at the time of the invention to have a wet-etching step instead of the plasma-etching step in Kinoshita's process, as taught by Xu, since etching is typically performed in the semiconductor industry by either plasma-etching or wet-etching.

Response to Arguments

16. The applicants argue:

Deguchi does not disclose overlay targets with a series of raised lines nor does it teach a semiconductor substrate selected from the group consisting of silicon, gallium and sapphire substrates.

The examiner responds:

Contrary to applicants' statements, Deguchi clearly shows (see, e.g., attached

English translation of Deguchi, supra, at 10-11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000)

translation provided by the applicants in paper no. 14)

Conclusion

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

18. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

19. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

20. Any inquiry concerning this communication or earlier communications from the

Art Unit 2814 Fax Center is to be directed to the Art Unit 2814 Fax Center

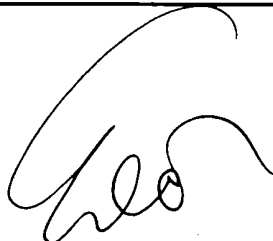
between the hours of 9:00 AM to 7:30 PM (Eastern Standard Time) Monday through

Thursday or by e-mail via Marcos Pizarro@uspto.gov. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (703) 306-2794.

21. Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist at (703) 308-0956**.

22. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 257/797 438/401, 462, 704, 706, 709-711, 719, 745, 783, 975	6/12/2002
Other Documentation:	
Electronic Database(s) EAST (USPAT, EPO, JPO)	6/12/2002



Marcos D. Pizarro-Crespo

Patent Examiner
Art Unit 2814

成できる。

本発明は、以上の実施例に限定されることなく、公知のドライエッチング法を適用すれば種々の材料の表面状態を光学的に反射率の低い微小な凹凸形状に成形するため、その応用範囲は極めて広い。

〔発明の効果〕

以上説明したように本発明によれば、被露光基板上に設けるアライメントマークの照明光に対するコントラストを大幅に改善でき、しかも、その形成方法が極めて簡便でかつ極めて高い歩留りが得られる利点を有する。

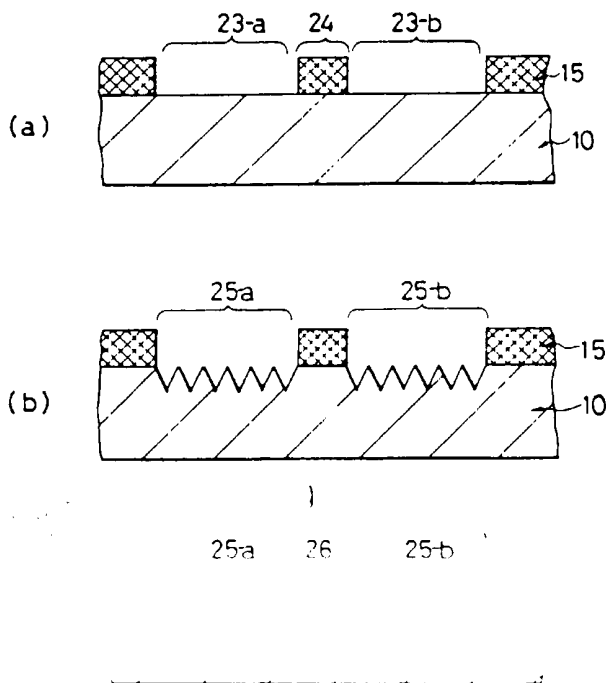
4. 図面の簡単な説明

第1図は本発明の一実施例を示す断面図、第2図は本発明の他の実施例を示す断面図、第3図はアライメントマークの検出原理を説明する図、第4図は従来のアライメントマークの形成方法を説明する断面図である。

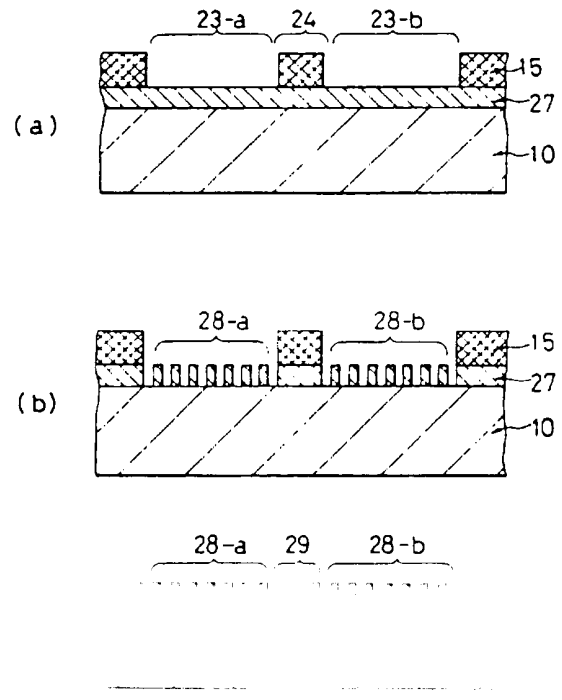
1…マスクのアライメントマーク、2…高反射部、3…透過部、4…ウェハのアライメント

マーク、5…高反射部、6…低反射部、7…照明光、8…マスクマークからの反射光、9…ウェハマークからの反射光、10…基板、11…マスクマークの検出信号、12…ウェハマークの検出信号、13…バックグラウンド、14…マスク材層、15…レジスト、16…ラインアンドスペースレジストパターン、17…直線レジストパターン、18…ラインアンドスペースマスク材層パターン、19…直線マスク材層パターン、20…円弧状断面を有する多数の微小窪みの配列からなる領域、21…円弧状パターン、22…平滑面、23…アライメントマークパターンのレジストのない部分、24…アライメントマークパターンのレジストパターン、25…微小な四角錐状の突起群、26…レジストパターン下部、27…Mo膜、28…微小な柱状結晶が林立した凹凸群、29…レジストパターン下部。

出願人代理人 井理士 鈴 江 武 彦



第 1 図



第 2 図